Can attend 10 am session if miss 9am

quizes every Thursday

exam dates posted - add to calendar

quizes have low weight

review integrals

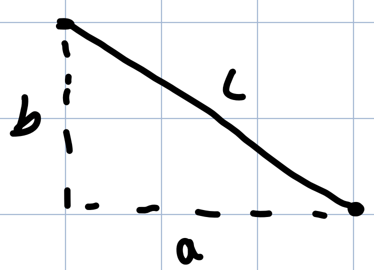
exam formula sheet provided

1st exam hard but new content 70% avg

2nd easiest 80% avg

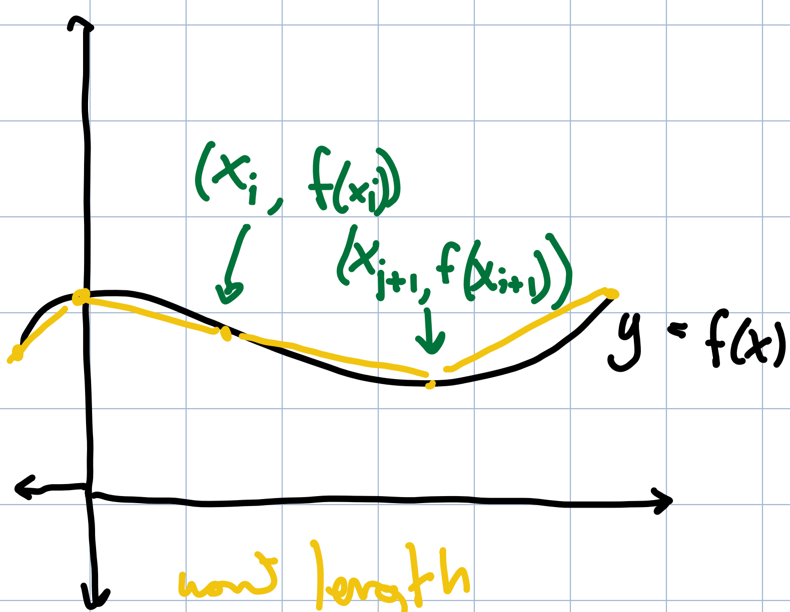
3rd hardest 70% avg

final final cumulative

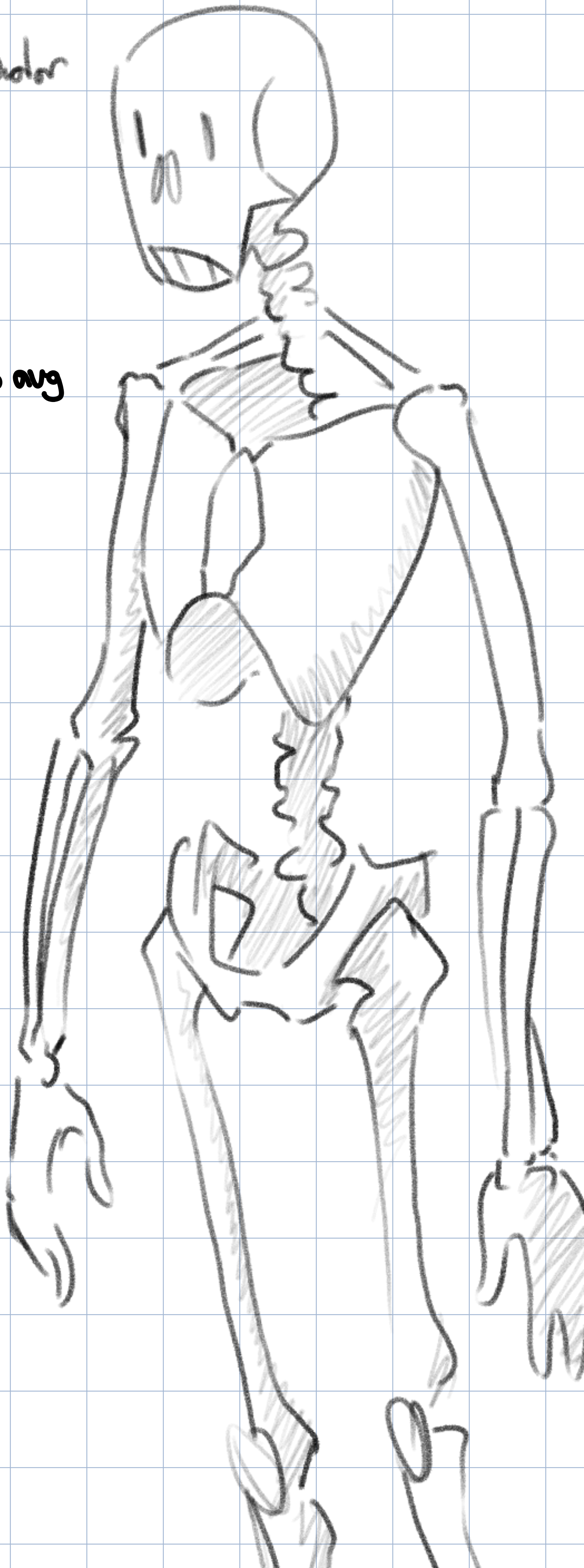


$a^2+b^2=c^2$

$c=\sqrt{a^2+b^2}$



arc length



to find distance between points

$$\sqrt{(x_{i+1}-x_i)^2+(f(x_{i+1})+f(x_i))^2}$$

factored out magically

$$\sqrt{\left[1+\frac{(f(x_i+1)-f(x_i))^2}{(x_{i+1}-x_i)^2}\right](x_i+1-x_i)^2}$$

$$\sqrt{\left(1+\left(\frac{f(x_i+1)-f(x_i)}{x_i+1-x_i}\right)^2\right)} \cdot \underbrace{\sqrt{(x_i+1-x_1)^2}}_{\text{becomes } \Delta x}$$

like $f'(x_i)$

$$\lim_{x\to a}\frac{f(x)-f(a)}{x-a}=f'(a)$$

$$\lim_{n\to\infty}\sum_{i=1}^{n}\sqrt{1+f'(x_i)^2}\,\Delta x$$

$$\boxed{\text{Arc length} = \int_a^b \sqrt{1+(f'(x))^2}\,dx}$$

Provided

Setting Up Integrals

① $f(x) = \frac{x^2}{2}$ on int $[0, 1]$

$f'(x) = \frac{\cancel{2}x}{\cancel{2}} = x$

Arc length $= \int_a^b \sqrt{1 + (f'(x))^2}\, dx$

$$\int_0^1 \sqrt{1+x^2}\, dx$$

② **Evaluate** $y = \frac{x^3}{3} + \frac{1}{4x}$ on $[1, 5]$

$(4x^{-1})' = \frac{4x^{-2}}{-1} = -4x^{-2}$

$f'(x) \quad x^2 - \frac{1}{4x^2}$

$$\int_1^5 \sqrt{1 + \left(x^2 - \frac{1}{4x^2}\right)^2}\, dx$$

$$\int_1^5 \sqrt{1 + x^4 - \frac{\cancel{x^2}}{4\cancel{x^2}} - \frac{\cancel{x^2}}{4\cancel{x^2}} + \frac{1}{16x^4}}\, dx$$

$$\int_1^5 \sqrt{1 + x^4 - \frac{1}{2} + \frac{1}{16x^4}}\, dx$$

$$\int^5 \sqrt{\frac{1}{2} + x^4 + \frac{1}{16x^4}}\, dx$$

$$\int_1^5 \sqrt{\left(x^2+\frac{1}{4x^2}\right)^2}\,dx = \int_1^5 x^2+\frac{1}{4x^2}\,dx$$

$$= \frac{x^3}{3}+\frac{1}{4}\cdot\frac{x^{-1}}{-1}\Bigg]_{x=1}^{x=5} = \frac{x^3}{3}-\frac{1}{4x}\Bigg]_{x=1}^{x=5} \qquad \frac{1}{4}x^{-2}$$

$$= \left(\frac{5^3}{3}-\frac{1}{4\cdot 5}\right)-\left(\frac{1}{3}-\frac{1}{4}\right)$$

$$= \frac{125}{3}-\frac{1}{20}-\frac{1}{3}-\frac{1}{4}$$